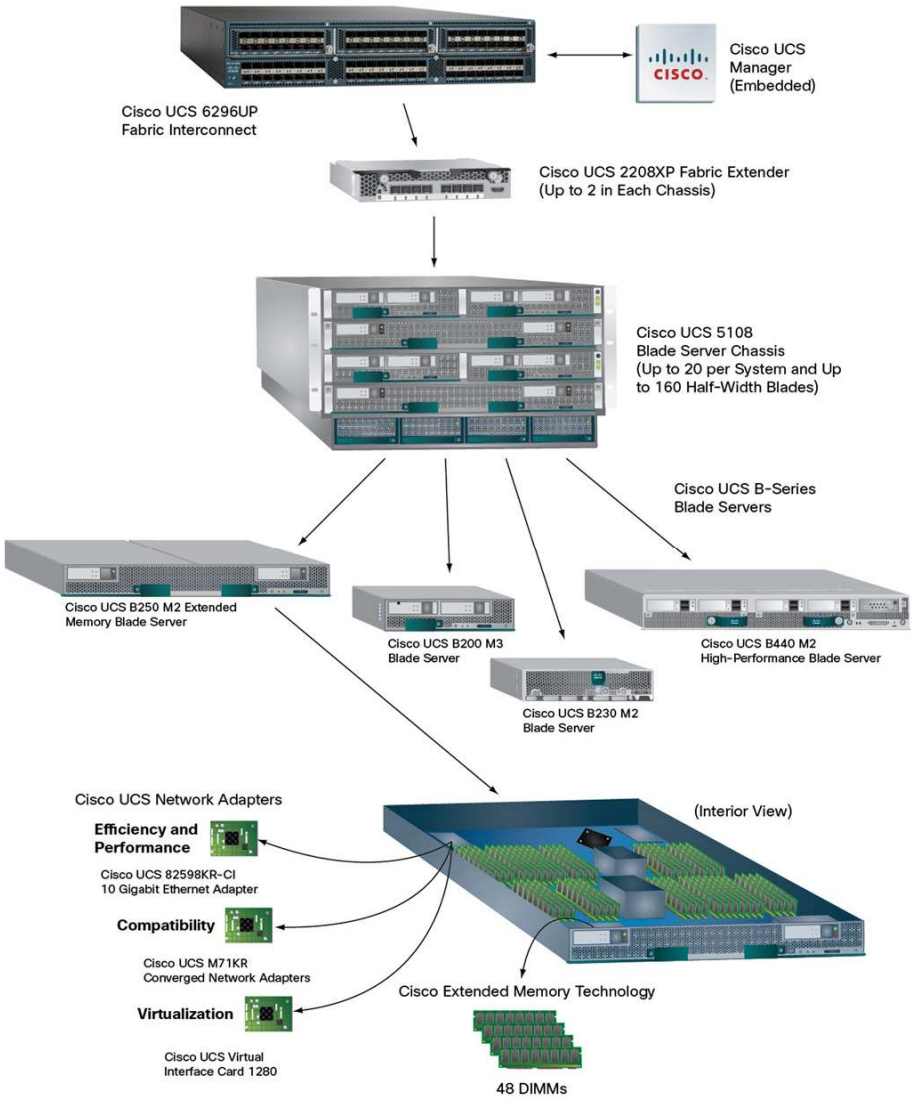
Cisco UCS 6200 Series Fabric Interconnects

Cisco Unified Computing System Overview

The Cisco Unified Computing System™ (Cisco UCS™) is a next-generation data center platform that unites computing, networking, storage access, and virtualization resources into a cohesive system designed to reduce total cost of ownership (TCO) and increase business agility. The system integrates a low-latency, lossless 10 Gigabit Ethernet unified network fabric with enterprise-class, x86-architecture servers. The system is an integrated, scalable, multichassis platform in which all resources participate in a unified management domain (Figure 1).

Figure 1. The Cisco Unified Computing System Is a Highly Available Cohesive Architecture



Product Overview

The Cisco UCS 6200 Series Fabric Interconnects are a core part of the Cisco Unified Computing System, providing both network connectivity and management capabilities for the system (Figure 2). The Cisco UCS 6200 Series offers line-rate, low-latency, lossless 10 Gigabit Ethernet, Fibre Channel over Ethernet (FCoE), and Fibre Channel functions.

The Cisco UCS 6200 Series provides the management and communication backbone for the Cisco UCS B-Series Blade Servers and 5100 Series Blade Server Chassis. All chassis, and therefore all blades, attached to the Cisco UCS 6200 Series Fabric Interconnects become part of a single, highly available management domain. In addition, by supporting unified fabric, the Cisco UCS 6200 Series provides both the LAN and SAN connectivity for all blades within its domain.

From a networking perspective, the Cisco UCS 6200 Series uses a cut-through architecture, supporting deterministic, low-latency, line-rate 10 Gigabit Ethernet on all ports, switching capacity of 2 terabits (Tb), and 320-Gbps bandwidth per chassis, independent of packet size and enabled services. The product family supports Cisco® low-latency, lossless 10 Gigabit Ethernet[1] unified network fabric capabilities, which increase the reliability, efficiency, and scalability of Ethernet networks. The fabric interconnect supports multiple traffic classes over a lossless Ethernet fabric from the blade through the interconnect. Significant TCO savings come from an FCoE-optimized server design in which network interface cards (NICs), host bus adapters (HBAs), cables, and switches can be consolidated.

Figure 2. Cisco UCS 6200 Series Fabric Interconnects

Unified Fabric with FCoE: I/O Consolidation

The Cisco UCS 6200 Series is built to consolidate LAN and SAN traffic onto a single unified fabric, saving the capital expenditures (CapEx) and operating expenses (OpEx) associated with multiple parallel networks, different types of adapter cards, switching infrastructure, and cabling within racks. The unified ports support allows either base or expansion module ports in the interconnect to support direct connections from Cisco UCS to existing native Fibre Channel SANs. The capability to connect FCoE to native Fibre Channel protects existing storage system investments while dramatically simplifying in-rack cabling.

[1] All Cisco UCS 6200 Series ports can alternatively be configured for 1 Gigabit Ethernet (see Table 2).

Cisco UCS Manager

The Cisco UCS 6200 Series hosts and runs Cisco UCS Manager in a highly available configuration, enabling the fabric interconnects to fully manage all Cisco UCS elements. Connectivity to the Cisco UCS 5100 Series blade chassis is maintained through the Cisco UCS 2100 or 2200 Series Fabric Extenders in each blade chassis. The Cisco UCS 6200 Series interconnects support out-of-band management through a dedicated 10/100/1000-Mbps Ethernet management port as well as in-band management. Cisco UCS Manager typically is deployed in a clustered active-passive configuration on redundant fabric interconnects connected through dual 10/100/1000 Ethernet clustering ports.

Optimization for Virtualization

For virtualized environments, the Cisco UCS 6200 Series supports Cisco virtualization-aware networking and Cisco Data Center Virtual Machine Fabric Extender (VM-FEX) architecture. Cisco Data Center VM-FEX allows the interconnects to provide policy-based virtual machine connectivity, with network properties moving with the virtual machine, and a consistent operational model for both physical and virtual environments.

Cisco UCS 6248UP 48-Port Fabric Interconnect

The Cisco UCS 6248UP 48-Port Fabric Interconnect (Figure 3) is a one-rack-unit (1RU) 10 Gigabit Ethernet, FCoE and Fiber Channel switch offering up to 960-Gbps throughput and up to 48 ports. The switch has 32 1/10-Gbps fixed Ethernet, FCoE and FC ports and one expansion slot.

Figure 3. Cisco UCS 6248UP 48-Port Fabric Interconnect

Cisco UCS 6296UP 96-Port Fabric Interconnect

The Cisco UCS 6296UP 96-Port Fabric Interconnect (Figure 4) is a 2RU 10 Gigabit Ethernet, FCoE and native Fibre Channel switch offering up to 1920-Gbps throughput and up to 96 ports. The switch has 48 1/10-Gbps fixed Ethernet, FCoE and Fiber Channel ports and three expansion slots.

Figure 4. Cisco UCS 6296UP 96-Port Fabric Interconnect

Table 1 summarizes the characteristics of the Cisco UCS 6200 Series Fabric interconnects.

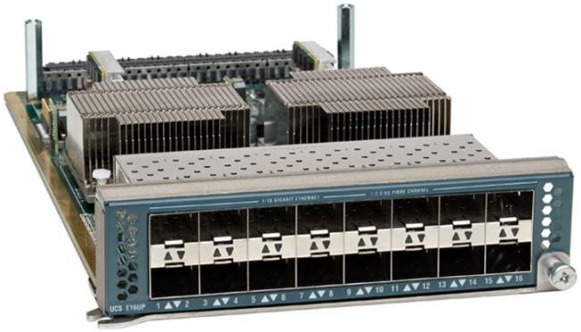
Table 1. Characteristics of Cisco UCS 6200 Series Fabric Interconnects[2]

Item	Cisco UCS 6248UP	Cisco UCS 6296UP
Description	48-port fabric interconnect	96-port fabric interconnect
Form factor	1RU	2RU
Number of fixed 10 Gigabit Ethernet and FCoE Enhanced Small Form-Factor Pluggable (SFP+) ports	32 fixed ports with an additional 16 ports available through expansion module	48 fixed ports with an additional 48 ports available through three expansion module
Throughput	960 Gbps	1920 Gbps
Expansion slots	1	3
Fan modules	1+1	2+2

Expansion Module Option for Cisco UCS 6200 Series Fabric Interconnects

The Cisco UCS 6200 Series supports an expansion module that can be used to increase the number of 10 Gigabit Ethernet, FCoE and FC ports (Figure 5). This unified port module provides up to 16 ports that can be configured for 10 Gigabit Ethernet, FCoE and/or 1/2/4/8-Gbps native Fibre Channel using the SFP or SFP+[3] interface for transparent connectivity with existing Fibre Channel networks.

Figure 5. Unified Port 16-Port Expansion Module



Features and Benefits

Table 2 summarizes the features and benefits of the Cisco UCS 6200 Series.

Table 2. Features and Benefits

Feature	Benefit
Management by Cisco UCS Manager	• Allows all elements connected to the interconnects to participate in a single, highly available management domain
Unified fabric	• Decreases TCO by reducing the number of NICs, HBAs, switches, and cables needed • Transparently encapsulates Fibre Channel packets into Ethernet
Fabric extender architecture	• Scales to 20 chassis without adding complexity by eliminating the need for dedicated chassis management and blade switches and by reducing the number of cables needed • Provides deterministic latency for optimized application performance
Performance	• Provides high-speed, low-latency connectivity to the chassis • Provides approximately 50% reduction in end-to-end system latency (latency is 3.2 microseconds)

[2] The Cisco UCS 6200 Series requires Cisco UCS Manager operating software Release 2.0 or later.
[3] Ports are fully compatible with the 8GFC standard and negotiate among 1, 2, 4, and 8 Gbps, constrained by optics compatibility. Ports support both 1/2/4-Gbps Cisco 4GFC optical transceivers using the SFP interface and 2/4/8-Gbps Cisco 8GFC optical transceivers using the SFP+ interface.

Feature	Benefit
Lossless fabric	• Provides a reliable, robust foundation for unifying LAN and SAN traffic on a single transport
Priority flow control (PFC)	• Simplifies management of multiple traffic flows over a single network link • Supports different classes of service, helping enable both lossless and classic Ethernet on the same fabric
Systemwide bandwidth management	• Helps enable consistent and coherent quality of service (QoS) throughout the system
Cisco Data Center VM-FEX technology	• Helps enable a consistent operational model between virtual and physical environments • Provides the same level of network visibility for virtualized and nonvirtualized environments • Improves diagnostic and troubleshooting capabilities in a virtual environment • Simplifies network and security policy enforcement when migrating virtual machines from one host to another
Rear ports	• Helps keep cable lengths short and efficient
Redundant hot-swappable fans and power supplies	• Helps enable high availability in multiple configurations • Increases serviceability • Provides uninterrupted service during maintenance
Front-to-back cooling	• Supports efficient data center hot- and cold-aisle designs
SFP+ ports	• Increases flexibility with a range of interconnect solutions, including copper Twinax cable for short runs and fiber for long runs • Consumes less power per port than traditional solutions • Helps enable cost-effective connections on fabric extenders with Cisco Fabric Extender Transceiver (FET) optics
SFP-compatible ports	• Allows all fixed and modular expansion ports to be configured to operate in 1 Gigabit Ethernet mode with the transceiver options specified for use with SFP-compatible ports in Table 3
Port-based licensing options	• Helps enable a pay-as-you-go model, allowing customers to add capacity as the networking needs of an individual system increase

Product Specifications

Transceivers

The Cisco UCS 6200 Series supports a wide variety of 10 Gigabit Ethernet connectivity options using Cisco 10GBASE SFP+ modules. In addition, all fixed and modular expansion ports on the Cisco UCS 6200 Series support 1 Gigabit Ethernet connectivity options using 1GBASE SFP modules. Alternatively, 2/4/8-Gbps Fibre Channel SFP+ and 1/2/4-Gbps Fibre Channel SFP interfaces are supported on all ports.

Table 3 lists the supported transceiver options.

Table 3. Cisco UCS 6200 Series Transceiver Support Matrix

Cisco SFP	Description
Cisco SFP-10G-SR	10GBASE-SR SFP+ module (multimode fiber [MMF])
Cisco SFP-10G-LR	10GBASE-LR SFP+ module (single-mode fiber [SMF])
Cisco SFP-H10GB-CU1M	10GBASE-CU SFP+ cable 1m (Twinax cable)
Cisco SFP-H10GB-CU3M	10GBASE-CU SFP+ cable 3m (Twinax cable)
Cisco SFP-H10GB-CU5M	10GBASE-CU SFP+ cable 5m (Twinax cable)
SFP-H10GB-ACU7M	10GBASE-CU SFP+ cable 7m (Twinax cable)
SFP-H10GB-ACU10M	10GBASE-CU SFP+ cable 10m (Twinax cable)
Cisco FET-10G	10GBASE-FET SFP+ module (MMF)
Cisco GLC-T	1000BASE-T SFP (for SFP-compatible ports only, as defined in Table 2)
Cisco GLC-SX-MM	GE SFP, LC connector SX transceiver (MMF) (for SFP-compatible ports only, as defined in Table 2)
Cisco GLC-LH-SM	GE SFP, LC connector LX/LH transceiver (SMF) (for SFP-compatible ports only, as defined in Table 2)
Cisco SFP-GE-T	1000BASE-T SFP, extended temperature range (for SFP-compatible ports only, as defined in Table 2)

Cisco SFP	Description
Cisco SFP-GE-S	GE SFP, LC connector SX transceiver (MMF), extended temperature range and digital optical monitoring (DOM) (for SFP-compatible ports only, as defined in Table 2)
Cisco SFP-GE-L	GE SFP, LC connector LX/LH transceiver (SMF), extended temperature range and DOM (for SFP-compatible ports only, as defined in Table 2)
Cisco DS-SFP-FC4G-SW	4-Gbps Fibre Channel SW SFP, LC
Cisco DS-SFP-FC4G-LW	4-Gbps Fibre Channel LW SFP, LC
Cisco DS-SFP-FC8G-SW	8-Gbps Fibre Channel SW SFP+, LC
Cisco DS-SFP-FC8G-LW	8-Gbps Fibre Channel LW SFP+, LC

Cabling

Table 4 provides 10 Gigabit Ethernet cabling specifications for the Cisco UCS 6200 Series.

Table 4. Cabling Specifications

Connector (Media)	Cable	Distance	Power (Each Side)	Transceiver Latency (Link)	Standard
SFP+ copper (CU)	Twinax	1, 3, and 5m	Approximately 0.1 watt (W)	Approximately 0.1 microsecond	SFF 8431
SFP+ FET	MM OM2 MM OM3 MM OM4	25 and 100m	1W	Approximately 0 microseconds	IEEE 802.3ae
SFP+ short reach (SR) and MMF	MM OM2 MM OM3 MM OM4	82 and 300m	1W	Approximately 0 microseconds	IEEE 802.3ae
SFP+ long reach (LR)	SMF	300m over SMF	1W	Approximately 0 microseconds	IEEE 802.3ae

Performance

- Cisco UCS 6248UP: Layer 2 hardware forwarding at 960 Gbps or 714.24 million packets per second (mpps)
- Cisco UCS 6296UP: Layer 2 hardware forwarding at 1.92 Tbps or 1428.48 million packets per second (mpps)
- MAC address table entries: 32,000
- Low-latency cut-through design: Provides predictable, consistent traffic latency regardless of packet size, traffic pattern, or enabled features

Layer 2

- Layer 2 interconnect ports and VLAN trunks
- IEEE 802.1Q VLAN encapsulation
- Support for up to 1024 VLANs and virtual SANs (VSANs) per interconnect
- Rapid Per-VLAN Spanning Tree Plus (PVRST+)
- Internet Group Management Protocol (IGMP) Versions 1, 2, and 3 snooping
- Cisco EtherChannel technology
- Link Aggregation Control Protocol (LACP): IEEE 802.3ad
- Advanced EtherChannel hashing based on Layer 2, 3, and 4 information
- Jumbo frames on all ports (up to 9216 bytes)

- Pause frames (IEEE 802.3x)

QoS

- Layer 2 IEEE 802.1p (class of service [CoS])
- Eight hardware queues per port
- Per-port QoS configuration
- CoS trust
- Per-port virtual output queuing
- CoS-based egress queuing
- Egress strict-priority queuing
- Egress port-based scheduling: Weighted Round-Robin (WRR)

High Availability

- Hot-swappable field-replaceable power supplies, fan modules, and expansion modules
- 1+1 power redundancy
- N+1 fan module redundancy

Management

- Interconnect management using redundant 10/100/1000-Mbps management or console ports
- All management provided through Cisco UCS Manager; please refer to the Cisco UCS Manager data sheet for more information about management interfaces

Low-Latency, Lossless 10 Gigabit Ethernet Unified Network Fabric

- PFC (per-priority pause frame support)
- Data Center Bridging Exchange (DCBX) Protocol
- IEEE 802.1Qaz: Bandwidth management
- Layer 2 multipathing (future)

Unified Ports

- All ports configurable as 1/10 Gigabit Ethernet or 1/2/4/8-Gbps Fibre Channel

Industry Standards

- IEEE 802.1p: CoS prioritization
- IEEE 802.1Q: VLAN tagging
- IEEE 802.1s: Multiple VLAN instances of Spanning Tree Protocol
- IEEE 802.1w: Rapid reconfiguration of Spanning Tree Protocol
- IEEE 802.3: Ethernet
- IEEE 802.3ad: LACP
- IEEE 802.3ae: 10 Gigabit Ethernet
- SFP+ support
- RMON

Physical Specifications

SFP+ Optics

Cisco UCS products support 10 Gigabit Ethernet SFP+ copper Twinax cables for short distances and SFP+ optics for longer distances. SFP+ has several advantages compared to other 10 Gigabit Ethernet connectivity options:

- Small 10 Gigabit Ethernet form factor
- Optical interoperability with XENPAK, X2, and 10 Gigabit Small Form-Factor Pluggable (XFP) interface types
- Low power consumption
- Hot-swappable device

Power Supply

Tables 5 and 6 summarize the power supply properties for the Cisco UCS 6200 Series.

Table 5. AC Power Supply

Property	Cisco UCS 6248UP	Cisco UCS 6296UP
Typical operating power	350W	750W
Maximum power	600W	950W
Input voltage	100 to 240 VAC	100 to 240 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Efficiency	95 to 98% (50 to 100% load)	95 to 98% (50 to 100% load)
RoHS compliance	Yes	Yes
Hot swappable	Yes	Yes
Heat dissipation	1998 BTU/hr	3163 BTU/hr

Table 6. DC Power Supply

Property	Cisco UCS 6248UP
Typical operating power	400W with 48-ports running 100%
Maximum output power	750W
Input voltage	-40 to -72VDC
Input current	25A maximum
Maximum input power	1000W
Efficiency	88 to 92% (50 to 100% load)
RoHS compliance	Yes
Hot swappable	Yes
Heat dissipation	75W (10% of 750W)

Cisco UCS 6200 Series Physical and Environmental Specifications

Table 7 summarizes the physical and environmental specifications for the Cisco UCS 6200 Series.

Table 7. Physical and Environmental Specifications

Property	Cisco UCS 6248UP	Cisco UCS 6296UP
Physical (height x width x depth)	1.72 x 17.3 x 30.0 in. (4.4 x 43.9 x 76.2 cm)	3.44 x 17.3 x 29.5 in. (8.8 x 43.9 x 74.9 cm)
Operating temperature	32 to 104℉ (0 to 40℃)	32 to 104℉ (0 to 40℃)
Nonoperating temperature	-40 to 158℉ (-40 to 70℃)	-40 to 158℉ (-40 to 70℃)
Humidity	5 to 95% (noncondensing)	5 to 95% (noncondensing)
Altitude	0 to 10,000 ft (0 to 300m)	0 to 10,000 ft (0 to 300m)

Weight

Table 8 summarizes the weights for the Cisco UCS 6200 Series.

Table 8. Weight

Component	Weight
Cisco UCS 6248UP with two power supplies, one expansion module, and two fan modules	35 lb (15.88 kg)
Cisco UCS 6296UP with two power supplies, three expansion module, and four fan modules	50 lb (22.67 kg)

Regulatory Standards Compliance: Safety and EMC

Table 9 summarizes Cisco UCS 6200 Series regulatory compliance.

Table 9. Regulatory Standards Compliance

Specification	Description
Regulatory compliance	Products should comply with CE Markings according to directives 2004/108/EC and 2006/95/EC
Safety	• UL 60950-1 • CAN/CSA-C22.2 No. 60950-1 • EN 60950-1 • IEC 60950-1 • AS/NZS 60950-1 • GB4943
EMC: Emissions	• 47CFR Part 15 (CFR 47) Class A • AS/NZS CISPR22 Class A • CISPR22 Class A • EN55022 Class A • ICES003 Class A • VCCI Class A • EN61000-3-2 • EN61000-3-3 • KN22 Class A • CNS13438 Class A
EMC: Immunity	• EN50082-1 • EN61000-6-1 • EN55024 • CISPR24 • EN300386 • KN 61000-4 series

Specification	Description
RoHS	The product is RoHS 5-compliant with exceptions for leaded ball grid array (BGA) balls and lead press-fit connectors

Warranty Information

Warranty information is provided at Cisco.com on the Product Warranties page.

Cisco Unified Computing Services

Using a unified view of data center resources, Cisco and our industry-leading partners deliver services that accelerate your transition to a unified computing environment. Cisco Unified Computing Services helps you quickly deploy your data center resources and optimize ongoing operations to better meet your business needs. For more information about these and other Cisco Data Center Services, visit http://www.cisco.com/go/dcservices.

Why Cisco?

Cisco has significant experience in listening to customer requirements and providing solid technology innovation for the enterprise data center. Cisco delivers standards-based solutions backed by a broad partner ecosystem of industry leaders to provide end-to-end customer solutions. Unified computing elevates the traditional product classification of network, server, storage, operating systems, and applications to a vision that encompasses the whole data center. Cisco, as one of the largest technology providers in the world, has the resources, expertise, and customer focus to deliver on this vision.

For More Information

For more information about the Cisco UCS 6200 Series Fabric Interconnects, visit http://www.cisco.com/en/US/products/ps10276/index.html or contact your local account representative.

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